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Maine Agricultural Experiment Station

BULLETIN No. 81.

MARCH, 1902.

FERTILIZER INSPECTION.

This Bulletin contains the analyses of Manufacturer's samples of brands of Fertilizers licensed before March 1, 1902. Dealers are cautioned to consult with the Station before offering brands not given in this Bulletin.

Requests for the Bulletins should be addressed to the
AGRICULTURAL EXPERIMENT STATION,
Orono, Maine.

MAINE

AGRICULTURAL EXPERIMENT STATION

ORONO, MAINE.

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FERTILIZER INSPECTION.

CHAS. D. WOODS, Director.

J. M. BARTLETT, Chemist in Charge of Fertilizer Analysis.

The law regulating the sale of commercial fertilizers in this State calls for two bulletins each year. The first of these contains the analyses of the samples received from the manufacturer, guaranteed to represent, within reasonable limits, the goods to be placed upon the market later. The second bulletin contains the analyses of the samples collected in the open market by a representative of the Station.

In the tables which follow the discussion there are given the results of the analyses of the manufacturers' samples of licensed brands. The tables include all the brands which have been licensed to March 1, 1902. Dealers are cautioned against handling any brands not given in this list without first writing the Station.

The figures which are given as the percentages of valuable ingredients guaranteed by the manufacturers are the minimum percentages of the guarantee. If, for instance, the guarantee is 2 to 3 per cent of nitrogen, it is evident that the dealer cannot be held to have agreed to furnish more than 2 per cent and so this percentage is taken as actual guarantee. The figures under the head of "found" are those showing the actual composition of the samples.

To produce profitable crops and at the same time to maintain and even to increase the productive capacity of the soil may rightly be termed "good farming." Many farmers are able to do this, and the knowledge of how to do it has been largely acquired through years of experience, during which the character

of the soil, its adaptability for crops, and the methods of its management and manuring have been made the subjects of careful study, without, however, any definite and accurate knowledge concerning manures and their functions in relation to soils and crops. To those who desire to study this question, the Station will on application, send a list of suitable books. Experience in the field, explained by experiments in the laboratory, has clearly demonstrated a few principles which underlie the successful and economical use of fertilizers.

Soils vary greatly in their capabilities of supplying food to crops. Different ingredients are deficient in different soils. The way to learn what materials are proper in a given case is by observation and experiment. The rational method for determining what ingredients of plant-food a soil fails to furnish in abundance, and how these lacking materials can be most economically supplied, is to put the questions to the soil with different fertilizing materials and get the reply in the crops produced. How to make these experiments is explained in Circular No. 8 of the Office of Experiment Stations of the U. S. Department of Agriculture. A copy of this circular can be had by applying to the Secretary of Agriculture, Washington, D. C., or to the Maine Agricultural Experiment Station.

The chief use of fertilizers is to supply plant-food. It is good farming to make the most of the natural resources of the soil and of the manures produced on the farm, and to depend upon artificial fertilizers only to furnish what more is needed. It is not good economy to pay high prices for materials which the soil may itself yield, but it is good economy to supply the lacking ones in the cheapest way. The rule in the purchase of costly commercial fertilizers should be to select those that supply, in the best forms and at the lowest cost, the plant-food which the crop needs and the soil fails to furnish.

Plants differ widely with respect to their capacities for gathering their food from soil and air; hence the proper fertilizer in a given case depends upon the crop as well as upon the soil. The fertility of the soil would remain practically unchanged if all the ingredients removed in the various farm products were restored to the land. This may be accomplished by feeding the crops grown on the farm to animals, carefully saving the manure and returning it to the soil. If it is practicable to pursue a system of

stock feeding in which those products of the farm which are comparatively poor in fertilizing constituents are exchanged in the market for feeding stuffs of high fertilizing value, the loss of soil fertility may be reduced to a minimum or there may be an actual gain in fertility.

CONSTITUENTS OF FERTILIZERS.

The only ingredients of plant-food which we ordinarily need to consider in fertilizers are potash, lime, sulphuric acid, phosphoric acid, and nitrogen. The available supply of sulphuric acid and lime is often insufficient; hence one reason for the good effect so often observed from the application of lime, and of plaster, which is a compound of lime and sulphuric acid. The remaining substances, nitrogen, phosphoric acid and potash, are the most important ingredients of our common commercial fertilizers, because of both their scarcity in the soil and their high cost. It is in supplying these that phosphates, bone manures, potash salts, guano, nitrate of soda, and most other commercial fertilizers are chiefly useful.

The term "form" as applied to a fertilizing constituent has reference to its combination or association with other constituents, which may be useful, though not necessarily so. The form of the constituent, too, has an important bearing upon its availability, and hence upon its usefulness as plant food. Many materials containing the essential elements are practically worthless as sources of plant food because the form is not right; the plants are unable to extract them from their combinations; they are "unavailable." In many of these materials the forms may be changed by proper treatment, in which case they become valuable not because the element itself is changed, but because it then exists in such form as readily to feed the plant.

Nitrogen is the most expensive of the three essential fertilizing elements. It exists in three distinct forms, organic matter, ammonia and nitrate.

Organic nitrogen exists in combination with other elements either as vegetable or animal matter. All materials containing organic nitrogen are valuable in proportion to their rapidity of decay, because change of form must take place before the nitrogen can serve as food. Organic nitrogen differs in availability not only according to the kind of material which supplies it, but

upon the treatment it receives. The nitrogen in the tables of analyses marked "insoluble in water" is organic nitrogen.

Nitrogen as ammonia usually exists in commercial manures in the form of sulphate of ammonia and is more readily available than organic nitrogen. While nitrogen in the form of ammonia is extremely soluble in water, it is not readily removed from the soil by leaching, as it is held by the organic compounds of the soil.

Nitrogen as nitrate exists in commercial products chiefly as nitrate of soda. Nitrogen in this form is directly and immediately available, no further changes being necessary. It is completely soluble in water, and diffuses readily throughout the soil. It differs from the ammonia compounds in forming no insoluble compounds with soil constituents and may be lost by leaching. The "Nitrogen soluble in water" of the tables includes both the nitrogen as ammonia and as nitrate.

Phosphoric acid is derived from materials called phosphates, in which it may exist in combination with lime, iron, or alumina as phosphates of lime, iron, or alumina. Phosphate of lime is the form most largely used as a source of phosphoric acid. Phosphoric acid occurs in fertilizers in three forms: That soluble in water and readily taken up by plants; that insoluble in water, but still readily used by plants, also known as "reverted;" and that soluble only in strong acids and consequently very slowly used by the plant. The "soluble" and "reverted" together constitute the "available" phosphoric acid. The phosphoric acid in natural or untreated phosphates is insoluble in water, and not readily available to plants. If it is combined with organic substance, as in animal bone, the rate of decay is more rapid than if with purely mineral substances. The insoluble phosphates may be converted into soluble forms by treatment with strong acids. Such products are known as acid phosphates or superphosphates. The "insoluble phosphoric acid" of a high cost commercial fertilizer has little or no value to the purchaser because at the usual rate of application the quantity is too small to make any perceptible effect upon the crop, and because its presence in the fertilizer excludes an equal amount of more needful and valuable constituents.

Potash in commercial fertilizers exists chiefly as muriates and sulphates. With potash the form does not exert so great an

influence upon availability as is the case with nitrogen and phosphoric acid. All forms are freely soluble in water, and are believed to be nearly if not quite equally available as food. The form of the potash has an important influence upon the quality of certain crops. For example, the results of experiments seem to indicate that the quality of tobacco, potatoes, and certain other crops is unfavorably influenced by the use of muriate of potash, while the same crops show a superior quality if materials free from chlorides have been used as the source of potash.

VALUATION OF FERTILIZERS.

The agricultural value of any of the fertilizing constituents is measured by the value of the increase of the crop produced by its use, and is, of course, a variable factor, depending upon the availability of the constituent, and the value of the crop produced. The form of the materials used must be carefully considered in the use of manures. Slow-acting materials can not be expected to give profitable returns upon quick growing crops, nor expensive materials profitable returns when used for crops of relatively low value.

The agricultural value is distinct from what is termed "commercial value," or cost in market. This value is determined by market and trade conditions, as cost of production of the crude material, methods of manipulation required, etc. Since there is no strict relation between agricultural and commercial or market value, it may happen that an element in its most available form, and under ordinary conditions of high agricultural value, costs less in market than the same element in less available forms and of a lower agricultural value. The commercial value has reference to the material as an article of commerce, hence commercial ratings of various fertilizers have reference to their relative cost and are used largely as a means by which the different materials may be compared.

The commercial valuation of a fertilizer consists in calculating the retail trade-value or cash-cost at freight centers (in raw material of good quality) of an amount of nitrogen, phosphoric acid and potash equal to that contained in one ton of the fertilizer. Plaster, lime, stable manure and nearly all of the less expensive fertilizers have variable prices, which bear no close relation to their chemical composition, but guanos, superphos-

phates and similar articles, for which \$20 to \$45 per ton are paid, depend for their trade value exclusively on the substances, nitrogen, phosphoric acid and potash, which are comparatively costly and steady in price. The trade-value per pound of these ingredients is reckoned from the current market prices of the standard articles which furnish them to commerce. The consumer, in estimating the reasonable price to pay for high-grade fertilizers, should add to the trade-value of the above named ingredients a suitable margin for the expenses of manufacture, etc., and for the convenience or other advantage incidental to their use.

The trade values for 1902 have not yet been agreed upon, but if any one wishes to calculate the valuation he can do so by using the prices adopted for 1901 by the experiment stations of Connecticut, Massachusetts, Rhode Island and New Jersey. It represents the retail prices at which these ingredients could then be purchased in the various forms mentioned. On account of the greater distance from the large markets, the prices for Maine would probably be a little higher than those quoted.

For many years this Station has not printed an estimate of the commercial value of the different brands licensed in the State.

TRADE VALUES OF FERTILIZING INGREDIENTS FOR 1901.

	Cents per lb.
Nitrogen in ammonia salts.....	16½
nitrates	14
Organic nitrogen in dry and fine ground fish, meat and blood and in mixed fertilizers....	16
in fine bone and tankage.....	16
in coarser bone and tankage.....	12
Phosphoric acid, water-soluble.....	5
citrate-soluble	4½
of dry, fine ground fish, bone and tankage	4
of coarser bone and tankage.....	3
of fine ground fish, cottonseed meal, castor pomace and wood ashes...	4
of mixed fertilizers, insoluble in ammonium citrate	2
Potash as high-grade sulphate and in forms free from muriate (or chlorides).....	5
as muriate	4¼

The commercial valuation will be accurate enough as a means of comparison if the following rule is adopted:

Multiply 3.3 by the percentage of nitrogen.

Multiply 1.0 by the percentage of available phosphoric acid.

Multiply 0.4 by the percentage of insoluble phosphoric acid.

Multiply 1.0 by the percentage of potash.

The sum of these four products will be the commercial valuation per ton on the basis taken.

Illustration. The table of analyses shows a certain fertilizer to have the following composition: Nitrogen 2.00%; Available phosphoric acid 8.50%; Insoluble phosphoric acid, 3.50%; Potash 3.25%. The valuation in this case will be computed thus:

Nitrogen,	$3.3 \times 2.00,$	6.60
Available phosphoric acid,	$1.0 \times 8.50,$	8.50
Insoluble phosphoric acid,	$0.4 \times 3.50,$	1.40
Potash,	$1.0 \times 3.25,$	3.25
Valuation per ton,		<u>\$19.75</u>

Since this rule assumes all the nitrogen to be organic and all the potash to be in the form of the sulphate, it is evident that the valuations thus calculated must not be taken as the only guide in the choice of a fertilizer. At best the valuations can only serve to show the approximate cost of the several ingredients contained in the fertilizer in question. In every case the farmer should consider the needs of his soil before he begins to consider the cost. In many instances a little careful experimenting will show him that materials containing either nitrogen, potash or phosphoric acid alone will serve his purpose as fully as a "complete fertilizer," in which he must pay for all three constituents, whether needed or not.

The results of the analysis of the manufacturer's samples of fertilizers are given on the following pages.

DESCRIPTIVE LIST OF MANUFACTURERS' SAMPLES, 1902.

Station number.	Manufacturer, place of business and brand.
	THE AMERICAN AGRICULTURAL CHEM. CO., NEW YORK, N. Y.
2112	Bradley's Complete Manure for Potatoes and Vegetables
2807	Bradley's Complete Manure with 10% Potash
2321	Bradley's Corn Phosphate
2111	Bradley's Eureka Fertilizer
2322	Bradley's Niagara Phosphate
2323	Bradley's Potato Fertilizer
2324	Bradley's Potato Manure
2325	Bradley's X. L. Superphosphate of Lime
2326	Clark's Cove Bay State Fertilizer
2327	Clark's Cove Bay State Fertilizer, G. G.
1219	Clark's Cove Bay State Fertilizer for Seeding Down
2390	Clark's Cove Defiance Complete Manure
2565	Clark's Cove Great Planet Manure, A. A.
2328	Clark's Cove King Philip Alkaline Guano
2778	Clark's Cove Potato Fertilizer
2779	Clark's Cove Potato Manure
1607	Cleveland Fertilizer for All Crops
2780	Cleveland High Grade Complete Manure
2329	Cleveland Potato Phosphate
2109	Cleveland Seeding Down Fertilizer
2330	Cleveland Superphosphate
2331	"Crocker's" Corn Phosphate
2332	"Crocker's" Grass and Oats
2333	"Crocker's" New Rival Ammoniated Superphosphate
2566	"Crocker's" Potato Hop and Tobacco
2795	"Crocker's" Special Potato Manure.
2335	"Crocker's" Superior
2567	Cumberland Guano for All Crops
2336	Cumberland Potato Fertilizer
1395	Cumberland Seeding Down Manure
2337	Cumberland Superphosphate
2377	Darling's Blood, Bone and Potash
1230	"Great Eastern" General.
1231	"Great Eastern" Grass and Oats
2395	"Great Eastern" High Grade Special Potato Manure
2384	"Great Eastern" Northern Corn Special
2568	"Great Eastern" Potato Manure
2781	High Grade Fertilizer with 10% Potash
2369	Otis' Potato Fertilizer
2380	Otis' Seeding Down Fertilizer
2368	Otis' Superphosphate
2782	Pacific Dissolved Bone and Potash
2338	Pacific Grass and Grain Fertilizer
2569	Pacific High Grade General Fertilizer

ANALYSES OF MANUFACTURERS' SAMPLES, 1902.

Station number.	NITROGEN.				PHOSPHORIC ACID.								POTASH.	
	Soluble in water.	Insoluble in water.	Total.		Soluble.	Reverted.	Insoluble.	Available.		Total.		Found.	Guaranteed.	
			Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.			
2112	%	%	%	%	%	%	%	%	%	%	%	%	%	
2807	1.06	2.40	3.46	3.30	5.36	3.32	1.51	8.68	8.00	10.19	9.00	6.91	7.00	
	1.99	1.31	3.30	3.30	3.59	3.19	2.44	6.78	6.00	9.22	7.00	11.20	10.00	
2321	0.66	1.42	2.08	2.06	7.05	2.55	2.56	9.60	8.00	12.16	10.00	2.01	1.50	
2111	0.11	1.06	1.17	1.03	5.93	2.35	1.55	8.28	8.00	9.83	10.00	2.32	2.00	
2322	0.40	0.64	1.04	0.82	5.41	3.15	1.38	8.56	7.00	9.94	8.00	1.49	1.00	
2323	0.77	1.22	1.99	2.06	5.74	4.74	2.54	10.48	8.00	13.02	10.00	3.17	3.00	
2324	0.81	1.58	2.39	2.50	2.89	3.80	3.18	6.69	6.00	9.87	8.00	5.15	5.00	
2325	1.10	1.36	2.46	2.50	6.74	3.16	1.80	9.90	9.00	11.70	11.00	2.68	2.00	
2326	1.14	1.32	2.46	2.50	7.26	3.08	1.80	10.34	9.00	12.14	11.00	2.35	2.00	
2327	0.62	1.40	2.02	2.06	7.21	2.42	2.36	2.63	8.00	11.99	10.00	1.95	1.50	
1219	.....	.....	2.33	1.03	7.18	2.55	1.89	9.73	8.00	11.62	10.00	2.59	2.00
2390	0.40	0.68	1.08	0.82	5.24	2.74	1.48	7.98	7.00	9.46	8.00	1.59	1.00	
2565	1.88	1.52	3.40	3.30	5.20	3.01	1.96	8.21	8.00	10.17	9.00	7.43	7.00	
2328	0.43	0.68	1.11	1.03	5.71	2.67	1.47	8.38	8.00	9.85	10.00	2.12	2.00	
2778	0.91	1.03	1.94	2.06	6.49	5.31	0.40	11.80	8.00	12.20	10.00	3.35	3.00	
2779	0.56	2.11	2.67	2.50	3.96	5.03	3.49	6.99	6.00	10.48	8.00	5.59	5.00	
1607	.....	.....	1.48	1.03	6.71	2.16	2.35	8.87	8.00	11.22	10.00	2.42	2.00
2780	2.02	1.21	3.23	3.30	4.96	3.41	2.27	8.37	8.00	10.64	9.00	7.53	7.00	
2329	0.62	1.34	1.96	2.06	5.95	3.99	2.74	9.94	8.00	12.68	10.00	3.03	3.00	
2109	0.11	1.06	1.17	1.03	5.79	2.89	1.27	8.68	8.00	9.95	10.00	2.20	2.00	
2330	0.66	1.40	2.06	2.06	7.17	2.35	2.62	9.52	8.00	12.14	10.00	2.03	1.50	
2331	0.26	2.06	2.32	2.06	4.52	3.65	3.87	8.17	8.00	12.04	.....	2.26	1.50
2332	.....	.....	.....	.....	7.54	4.28	1.79	11.82	11.00	13.61	.....	2.03	2.00
2333	0.23	1.14	1.37	1.03	4.82	3.70	2.47	8.52	8.00	10.99	.....	2.12	2.00
2566	1.10	1.10	2.20	2.06	5.98	2.07	2.68	8.05	8.00	10.73	.....	3.34	3.00
2795	2.01	1.30	3.31	3.29	3.84	3.29	2.34	7.13	6.00	9.47	.....	10.80	10.00
2335	0.10	0.96	1.06	0.82	5.19	3.87	2.11	9.06	8.00	11.17	....	2.12	2.00
2567	0.03	1.23	1.26	1.03	6.22	3.00	2.49	9.22	8.00	11.71	10.00	2.28	2.00	
2336	0.72	1.34	2.06	2.06	6.13	4.17	2.32	10.30	8.00	12.63	10.00	3.38	3.00	
1395	.....	....	1.10	1.03	5.82	1.98	2.11	7.80	8.00	9.91	10.00	2.93	2.00
2337	0.56	1.38	1.94	2.06	7.01	2.38	2.55	9.39	8.00	11.94	10.00	2.35	1.50	
2377	..	4.21	4.21	4.10	6.47	1.27	0.26	7.74	7.00	8.00	8.00	9.01	7.00	
1230	.....	.....	1.10	0.82	0.69	9.25	2.26	9.94	8.00	12.20	.....	4.72	4.00
1231	.....	.....	.....	.....	4.11	6.88	4.08	10.99	11.00	15.07	.....	2.15	2.00
2395	2.38	1.00	3.28	3.29	4.87	3.25	1.86	8.12	6.00	9.98	.....	10.64	10.00
2384	0.42	1.84	2.26	2.06	5.02	4.60	2.35	9.62	8.00	11.98	.....	2.26	1.50
2568	0.85	1.23	2.08	2.06	5.92	2.31	2.76	8.23	8.00	10.99	.....	3.37	3.00
2781	1.50	1.03	2.53	2.40	5.82	1.76	2.63	7.58	6.00	10.21	7.00	10.44	10.00	
2369	0.77	1.22	1.99	2.06	5.68	5.03	2.42	10.71	8.00	13.13	10.00	3.20	3.00	
2380	0.49	0.62	1.11	1.03	5.46	2.89	1.35	8.35	8.00	9.70	10.00	1.56	2.00	
2368	0.68	1.38	2.06	2.06	6.94	2.92	2.43	9.86	8.00	12.29	10.00	2.16	1.50	
2782	.....	.....	.....	.....	5.98	4.81	1.91	10.79	10.00	12.70	12.00	2.43	2.00
2338	0.42	0.64	1.06	0.82	5.46	3.01	1.43	8.47	7.00	9.90	8.00	2.99	1.00	
2569	2.13	1.41	3.54	3.30	5.15	2.92	2.14	8.07	8.00	10.21	9.00	7.18	7.00	

DESCRIPTIVE LIST OF STATION SAMPLES, 1902.

Station number.	Manufacturer, place of business and brand.
2339	Pacific Nobsque Guano.
2340	Pacific Potato Special.
2342	"Packers Union" Animal Corn Fertilizer.
2343	"Packers Union" Economical Vegetable Guano.
2571	"Packers Union" Gardeners Complete Manure.
2344	"Packers Union" Potato Manure.
2345	"Packers Union" Universal Fertilizer.
1619	"Packers Union" Wheat, Oats and Clover Fertilizer.
2393	Quinnipiac Climax Phosphate for All Crops.
2347	Quinnipiac Corn Manure.
2572	Quinnipiac Market Garden Manure.
2573	Quinnipiac Mohawk Fertilizer.
2349	Quinnipiac Potato Manure.
2350	Quinnipiac Potato Phosphate.
2351	Quinnipiac Seeding Down Manure.
2783	Read's Farmers' Friend.
2352	Read's Potato Manure.
1396	Read's Practical Potato Special.
1397	Read's Standard Superphosphate.
2354	Read's Sure Catch Fertilizer.
2355	Read's Vegetable and Vine Fertilizer.
2341	Soluble Pacific Guano.
1414	Standard A Brand.
2574	Standard Bone and Potash.
2394	Standard Complete Manure.
2361	Standard Fertilizer.
2362	Standard Guano for All Crops.
2363	Standard Special for Potatoes.
2364	Williams and Clark's Americus Ammoniated Bone Superphosphate.
2365	Williams and Clark's Americus Corn Phosphate.
2576	Williams and Clark's Americus High Grade Special.
2366	Williams and Clark's Americus Potato Manure.
2375	Williams and Clark's Americus with 10% Potash.
1236	Williams and Clark's Royal Bone Phosphate for All Crops.
THE BOWKER FERTILIZER CO., BOSTON, MASS.	
2579	Bowker's Corn Phosphate.
2580	Bowker's Early Potato Manure.
2581	Bowker's Farm and Garden Phosphate.
2582	Bowker's Hill and Drill Phosphate.
2584	Bowker's Potash Bone.
2585	Bowker's Potash or Staple Phosphate.
2586	Bowker's Potato and Vegetable Fertilizer.
2587	Bowker's Potato and Vegetable Phosphate.
2588	Bowker's Six Per Cent Fertilizer.
2589	Bowker's Square Brand Bone and Potash.
2590	Bowker's Sure Crop Phosphate.
2591	Bowker's Ten Per Cent Manure.

ANALYSES OF MANUFACTURERS' SAMPLES, 1902.

Station number.	NITROGEN.				PHOSPHORIC ACID.								POTASH.	
	Soluble in water.	Insoluble in water.	Total.		Soluble.	Reverted.	Insoluble.	Available.		Total.		Found.	Guaranteed.	
			Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.			
	%	%	%	%	%	%	%	%	%	%	%	%	%	
2339	0.40	0.66	1.06	1.03	5.52	2.66	1.63	8.18	8.00	9.81	10.00	1.97	2.00	
2340	0.76	1.34	2.10	2.06	5.69	4.27	2.70	9.96	8.00	12.66	10.00	3.15	3.00	
2342	0.31	2.10	2.41	2.47	5.64	3.22	3.46	8.86	9.00	12.32	.....	1.91	2.00
2343	0.26	1.47	1.68	1.25	4.65	2.55	2.15	7.20	6.00	9.35	.....	3.59	3.00
2571	1.38	1.16	2.54	2.47	5.58	0.47	2.06	6.05	6.00	8.11	...	10.99	10.00	
2344	0.96	1.10	2.06	2.06	4.85	3.16	1.85	8.01	8.00	9.86	.....	6.54	6.00
2345	0.25	0.96	1.21	0.82	6.05	3.22	1.46	9.27	8.00	10.73	.....	5.04	4.00
1619	.....	.....	.....	.....	.....	.....	1.20	10.92	11.00	12.12	...	2.39	2.00
2398	0.39	1.06	1.45	1.03	5.10	3.54	1.63	8.64	8.00	10.27	10.00	2.91	2.00	
2347	0.67	1.38	2.05	2.06	6.69	2.63	2.41	9.32	8.00	11.73	10.00	1.95	1.50	
2572	2.19	1.39	3.58	3.30	4.23	4.67	1.47	8.90	8.00	10.37	9.00	7.57	7.00	
2573	0.03	0.83	0.86	0.82	2.60	4.87	3.86	7.47	7.00	11.33	8.00	1.58	1.00	
2349	1.03	1.50	2.53	2.50	2.55	4.03	3.06	6.58	6.00	9.64	8.00	5.15	5.00	
2350	0.74	1.30	2.04	2.06	5.61	4.71	2.36	10.32	8.00	12.68	10.00	3.34	3.00	
2351	0.39	0.64	1.03	1.03	5.44	3.14	1.46	8.85	8.00	10.04	10.00	2.61	2.00	
2783	0.81	1.05	1.86	2.06	6.41	2.92	2.49	9.33	8.00	11.82	10.00	3.33	3.00	
2352	0.42	2.28	2.70	2.40	4.59	1.89	1.25	6.48	6.00	7.73	7.00	10.94	10.00	
1396	.....	.....	1.20	0.82	3.39	1.55	0.54	4.94	4.00	5.48	5.00	8.35	8.00
1397	.....	.....	1.15	0.82	6.50	1.73	0.92	8.23	8.00	9.15	10.00	4.33	4.00
2354	.....	.....	.....	.....	4.46	5.17	1.58	9.81	10.00	11.39	12.00	1.91	2.00
2355	0.32	1.80	2.12	2.06	5.94	2.25	1.38	8.29	8.00	9.67	10.00	6.35	6.00	
2341	0.52	1.46	1.98	2.06	6.72	2.72	2.32	9.44	8.00	11.76	10.00	1.91	1.50	
1414	.....	.....	1.33	0.82	4.84	3.08	1.96	7.92	7.00	9.88	8.00	1.71	1.00
2574	.....	.....	.....	.....	7.66	2.60	1.96	10.26	10.00	12.22	12.00	2.08	2.00
2394	2.40	0.90	3.30	3.30	7.02	1.99	1.04	8.81	8.00	9.85	9.00	7.56	7.00	
2361	0.60	1.42	2.02	2.06	6.82	2.43	2.55	9.25	8.00	11.80	10.00	2.01	1.50	
2362	0.37	0.70	1.07	1.03	5.31	3.03	1.44	8.34	8.00	9.74	10.00	2.10	2.00	
2363	0.82	1.20	2.02	2.06	5.65	5.16	2.40	10.81	8.00	13.21	10.00	2.93	3.00	
2364	0.95	1.32	2.27	2.50	6.72	3.08	1.94	9.80	9.00	11.74	11.00	2.35	2.00	
2365	0.56	1.42	1.98	2.06	6.75	2.85	2.29	9.60	8.00	11.89	10.00	1.95	1.50	
2576	2.15	1.39	3.54	3.30	3.80	4.10	2.15	7.90	8.00	10.05	9.00	7.48	7.00	
2366	0.64	1.32	1.96	2.06	5.52	4.89	2.23	10.41	8.00	12.64	10.00	3.03	3.00	
2575	0.96	1.18	2.14	2.40	4.18	2.29	1.67	6.47	6.00	8.14	7.00	10.62	10.00	
1236	.....	.....	1.26	1.03	6.20	3.11	2.23	9.30	8.00	11.54	10.00	2.26	2.00
2579	0.40	1.14	1.54	1.50	2.27	5.90	2.19	8.17	8.00	10.86	10.00	2.52	2.00	
2580	1.19	1.95	3.14	3.00	3.57	3.49	2.23	7.06	7.00	9.29	9.00	7.33	7.00	
2581	0.52	1.16	1.68	1.50	2.30	6.62	2.50	8.92	8.00	11.42	10.00	2.80	2.00	
2582	0.71	1.73	2.44	2.25	3.27	5.48	2.76	8.75	9.00	11.51	11.00	2.16	2.00	
2584	0.90	.....	0.90	0.75	3.05	1.93	3.03	4.98	6.00	8.01	8.00	2.10	2.00
2585	0.18	0.74	0.92	0.75	1.69	6.43	2.15	8.12	8.00	10.27	10.00	3.37	3.00	
2586	0.61	1.73	2.34	2.25	7.26	2.32	0.83	9.58	9.00	10.41	10.00	4.30	4.00	
2587	0.30	1.18	1.48	1.50	2.28	6.79	2.31	9.07	9.00	11.38	11.00	2.32	2.00	
2588	0.35	0.65	1.00	0.75	1.39	4.82	3.05	6.21	6.00	9.26	9.00	6.48	6.00	
2589	1.03	0.81	1.84	1.50	1.04	3.68	7.10	4.72	6.00	11.82	12.00	2.34	2.00	
2590	.....	0.78	0.78	0.75	3.16	6.12	2.31	9.28	9.00	11.59	11.00	2.36	2.00
2591	0.17	0.69	0.86	0.75	1.29	3.92	1.99	5.21	5.00	7.20	7.00	10.34	10.00	

DESCRIPTIVE LIST OF MANUFACTURER'S SAMPLES, 1902.

Station number.

Manufacturer, place of business and brand.

2592	Gloucester Fish and Potash
2593	Stockbridge Corn and Grain Manure.
2594	Stockbridge Potato Manure
2595	Stockbridge Seeding Down Manure
	C. C. CLARK & SON, MT. EPHRAIM, N. J.
2784	Clark's High Grade Potato Manure.
	E. FRANK COE CO., NEW YORK CITY, N. Y.
2806	E. Frank Coe's Celebrated Special Potato Fertilizer
2797	E. Frank Coe's Columbian Bone Superphosphate.
2796	E. Frank Coe's Columbian Corn Fertilizer.
2798	E. Frank Coe's Columbian Potato Fertilizer
2799	E. Frank Coe's Excelsior Potato Fertilizer
2805	E. Frank Coe's Grass and Grain Special
2800	E. Frank Coe's High Grade Ammoniated Bone Superphosphate
2801	E. Frank Coe's High Grade Potato Fertilizer.
2802	E. Frank Coe's New Englander Corn Fertilizer
2803	E. Frank Coe's New Englander Potato Fertilizer
2808	E. Frank Coe's Prize Brand Grain and Grass Fertilizer.
2804	E. Frank Coe's Red Brand Excelsior Guano
	DEERING PACKING CO., SACO, ME.
2785	Perfection Fertilizer
	FERNALD, KEENE & TRUE CO., WEST POLAND, ME.
2809	Fernald, Keene & True's Sweet Corn Manure
	WALTER G. FOSS, FOXCROFT, ME.
2786	New Market Fertilizer
	LISTER'S AGRICULTURAL CHEMICAL WORKS, NEWARK, N. J.
2614	Animal Bone and Potash
2610	High Grade Special for Spring Crops
2787	Potato Manure
2613	Seeding Down.
2609	Special Corn and Potato Fertilizer
2611	Lister's Success Fertilizer.
	LOWELL FERTILIZER CO., BOSTON, MASS.
1874	Swift's Lowell Animal Brand.
1875	Swift's Lowell Bone Fertilizer
1876	Swift's Lowell Dissolved Bone and Potash
2386	Swift's Lowell Ground Bone.
2387	Swift's Lowell Potato Manure
1877	Swift's Lowell Potato Phosphate
	NATIONAL FERTILIZER CO., BRIDGEPORT, CONN.
1885	Chittenden's Ammoniated Bone
1886	Chittenden's Complete Fertilizer.
2385	Chittenden's Market Garden.
	NEW ENGLAND FERTILIZER CO., BOSTON, MASS.
2378	New England Corn Phosphate.
2379	New England Potato Fertilizer
2788	New England Seeding Fertilizer.
	EDWIN J. PHILBRICK, AUGUSTA, ME.
1888	Philbrick's Fertilizer

ANALYSES OF MANUFACTURERS' SAMPLES, 1902.

Station number.	NITROGEN.				PHOSPHORIC ACID.								POTASH.	
	Soluble in water.	Insoluble in water.	Total.		Soluble.	Reverted.	Insoluble.	Available.		Total.		Found.	Guaranteed.	
			Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.			
	%	%	%	%	%	%	%	%	%	%	%	%	%	
2592	0.26	0.56	0.82	0.75	1.18	5.34	2.90	6.52	6.00	9.42	9.00	1.25	1.00	
2593	1.29	1.97	3.26	3.00	3.51	1.59	2.04	8.10	7.00	10.14	9.00	7.24	7.00	
2594	1.32	1.88	3.20	3.00	2.57	3.54	2.27	6.11	6.00	8.38	8.00	10.34	10.00	
2595	0.79	1.59	2.38	2.25	2.97	2.88	4.24	5.85	6.00	10.09	10.00	10.04	10.00	
2784	2.31	1.50	3.81	3.28	5.50	3.05	1.90	8.55	7.00	10.45	8.00	7.41	5.00	
2806	1.26	0.62	1.88	1.65	7.34	1.19	2.71	8.53	8.00	11.24	9.50	4.73	4.00	
2797	0.63	0.56	1.19	1.20	6.03	2.50	2.70	8.53	8.50	11.23	10.00	3.90	2.50	
2796	0.60	0.74	1.34	1.20	7.29	2.77	2.53	9.46	8.50	12.01	10.00	2.98	2.50	
2798	0.54	0.80	1.34	1.20	6.30	2.16	2.49	9.46	8.50	11.95	10.00	3.08	2.50	
2799	1.46	0.96	2.42	2.40	6.03	1.97	2.22	8.00	7.00	10.22	8.50	9.35	8.00	
2805	0.07	0.73	0.80	0.80	6.73	2.57	2.81	9.30	8.50	12.11	10.00	2.28	1.50	
2800	1.02	1.06	2.08	1.85	6.76	2.26	2.30	9.02	9.00	11.32	13.00	3.09	2.25	
2801	1.68	0.92	2.60	2.40	7.15	1.53	2.76	8.68	7.50	21.44	8.50	6.48	6.00	
2802	0.63	0.70	1.33	0.80	7.15	2.42	2.60	9.57	7.50	12.17	9.00	3.11	3.00	
2803	0.37	0.66	1.03	0.80	6.09	2.36	2.78	8.45	7.50	11.23	9.00	3.28	3.00	
2808	.....	.....	.....	.....	6.64	3.96	3.06	10.55	10.50	13.61	12.00	2.59	2.00
2804	2.30	2.07	3.37	3.40	7.59	2.14	1.77	9.73	9.00	11.50	10.50	6.74	6.00	
2785	0.52	0.40	0.92	0.40	7.27	3.61	0.72	10.88	6.00	11.60	8.00	2.86	2.00	
2809	1.82	0.79	2.61	2.50	6.75	3.64	1.72	10.39	9.00	12.11	11.00	2.80	2.00	
2786	0.49	0.35	0.84	0.40	7.26	3.52	0.83	10.78	6.00	11.61	8.00	2.82	2.00	
2614	....	....	....	....	8.01	1.61	1.53	9.62	10.00	11.15	11.00	2.34	2.00
2610	0.59	1.07	1.66	1.65	6.36	1.54	2.23	7.90	8.00	10.13	9.00	10.75	10.00	
2787	1.92	1.25	3.17	3.30	5.50	2.46	3.09	7.96	8.00	11.05	9.00	7.22	7.00	
2613	0.28	0.78	1.06	0.83	3.88	3.34	3.03	7.22	7.00	10.25	8.00	1.25	1.00	
2609	0.59	10.7	1.66	1.65	5.44	3.22	2.54	8.66	8.00	11.20	9.00	3.23	3.00	
2611	0.31	0.99	1.30	1.24	6.16	3.02	2.58	9.18	9.00	11.76	11.00	2.37	2.00	
1874	.....	.....	2.85	2.47	....	.....	1.01	10.38	9.00	11.39	10.00	4.10	4.00
1875	.....	.....	2.06	1.65	....	.....	1.31	8.27	8.00	9.58	9.00	3.56	3.00
1876	.....	.....	1.90	1.65	....	.....	1.73	9.33	9.00	11.06	10.00	2.45	2.00
2386	.....	.....	2.38	2.47	....	.....	.....	.....	.....	27.24	25.00	.....	.....
2387	0.78	0.94	1.72	1.65	3.33	4.47	1.35	7.80	7.00	9.15	8.00	4.52	4.00	
1877	.....	.....	2.61	2.47	.....	.....	1.08	9.41	8.00	10.49	9.00	6.96	6.00
1885	.....	.....	2.42	1.60	.....	.....	1.61	9.72	8.00	11.33	10.00	3.69	2.00
1886	.....	.....	3.79	3.30	.....	.....	1.33	9.35	8.00	10.68	10.00	6.31	6.00
2385	1.22	1.00	2.22	2.47	4.45	2.60	2.48	7.05	6.00	9.53	8.00	5.94	5.00	
2378	0.76	1.02	1.78	1.65	3.85	4.93	1.33	8.78	8.00	10.11	9.00	3.23	3.00	
2379	0.88	0.88	1.76	1.64	3.46	4.89	0.98	8.35	7.00	9.33	8.00	4.28	4.00	
2788	0.78	0.67	1.45	1.22	4.42	2.95	1.21	7.37	7.00	8.58	8.00	2.63	2.00	
1888	0.38	1.65	2.03	2.00	2.00	5.19	1.74	7.19	7.00	8.93	9.00	5.58	5.00	

DESCRIPTIVE LIST OF MANUFACTURERS SAMPLES, 1902.

Station number.	Manufacturer, place of business and brand.
	THE PARMENTER & POLSEY FERTILIZER CO., PEABODY, MASS.
2598	A A Brand Fertilizer.....
2599	Grain Grower.....
2346	P. & P. Potato Fertilizer.....
2123	Plymouth Rock Brand Fertilizer.....
2124	Special Potato Fertilizer.....
2125	Star Brand Superphosphate.....
	PORTLAND RENDERING CO., PORTLAND, ME.
2776	Bone Tankage.....
	PROVINCIAL CHEMICAL FERTILIZER CO., LIMITED, ST. JOHN, N. B.
2560	Potato Phosphate.....
	RUSSIA CEMENT CO., GLOUCESTER, MASS.
2600	Essex A 1 Superphosphate.....
2601	Essex Complete Manure for Corn, Grain and Grass.....
1411	Essex Complete Manure for Potatoes, Roots and Vegetables.....
2106	Essex Corn Fertilizer.....
2602	Essex Market Garden and Potato Manure.....
1568	Essex XXX Fish and Potash.....
	SAGADAHOC FERTILIZER CO., BOWDOINHAM, ME.
2789	Aroostook Potato Manure.....
2790	Clark's Mixture.....
2791	Dirigo Fertilizer.....
2792	Sagadahoc High Grade Superphosphate.....
2793	Special Potato Fertilizer.....
2794	Yankee Fertilizer.....
	JOHN WATSON, HOULTON, ME.
2608	Watson's Improved High Grade Potato Manure.....

NOTE—While this Bulletin was in press the Bowker Fertilizer Company applied for licenses for the Maine State Grange Potato Manure with the following guaranteed analysis: Nitrogen, 1.50 per cent; available phosphoric acid, 9 per cent; total phosphoric acid, 12 per cent; potash, 12 per cent; and Maine State Grange Chemicals with a guaranteed analysis of nitrogen, 2.5 per cent; available phosphoric acid, 8 per cent; total phosphoric acid, 12 per cent; potash, 4 per cent.

The Sagadahoc Fertilizer Company have also applied for license for Special Clover Fertilizer with a guaranteed analysis of available phosphoric acid, 6 per cent; total phosphoric acid, 9 per cent.

ANALYSES OF MANUFACTURERS' SAMPLES, 1902.

Station number.	NITROGEN.				PHOSPHORIC ACID.								POTASH.	
	Soluble in water.	Insoluble in water.	Total.		Soluble.	Reverted.	Insoluble.	Available.		Total.		Found.	Guaranteed.	
			Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.			
2598	3.14	1.52	4.66	4.53	3.59	4.04	2.03	7.63	7.00	9.66	8.00	8.12	8.00	
2599	0.59	0.61	1.20	0.82	3.30	4.45	4.32	7.75	7.00	12.07	8.06	2.70	2.00	
2346	1.00	0.84	1.84	1.64	2.36	5.15	0.99	7.51	6.00	8.50	7.00	6.91	6.00	
2123	0.21	2.08	2.29	2.47	3.81	4.21	1.38	8.02	8.00	9.40	9.00	4.19	4.00	
2124	1.69	1.29	2.98	3.29	4.21	4.27	1.29	8.48	8.00	9.77	9.00	7.41	7.00	
2125	1.01	0.79	1.80	1.64	3.80	3.54	1.15	7.34	7.00	8.49	8.00	2.60	2.50	
2776	2.69	3.43	6.12	6.00	.....	.....	4.85	9.57	.....	14.42	14.00	.....	.....
2560	.....	.....	3.46	3.09	6.81	1.44	6.68	8.25	8.00	14.93	14.00	7.20	6.50
2600	0.18	1.34	1.52	1.00	1.96	5.32	4.93	7.29	7.00	12.22	9.00	2.11	2.00	
2601	0.97	2.91	3.88	3.30	5.90	3.75	1.50	9.65	7.00	11.15	9.50	9.36	9.50	
1411	.....	... ..	3.96	3.70	2.60	5.54	2.84	8.14	7.00	10.98	9.00	9.18	8.50
2106	0.52	1.72	2.24	2.00	5.31	4.03	4.14	9.34	8.50	13.48	10.50	3.33	3.00	
2602	0.79	1.55	2.34	2.00	5.25	5.17	2.65	10.42	8.00	13.07	10.00	5.06	5.00	
1568	....	.....	2.68	2.10	8.00	2.63	2.56	10.63	9.00	13.19	12.00	2.75	2.25
2789	0.68	0.55	1.23	1.50	5.41	2.89	1.05	8.30	7.00	9.35	8.00	4.36	3.00	
2790	6.35	1.29	7.64	7.50	0.19	6.51	2.52	6.70	2.00	9.22	8.00	8.94	8.00	
2791	0.35	0.81	1.16	1.50	2.63	4.63	5.66	7.26	5.00	12.92	12.00	4.66	1.75	
2792	1.04	1.01	2.05	2.00	4.21	4.13	1.79	8.34	7.00	10.13	8.00	5.16	3.00	
2793	1.83	0.67	2.50	2.25	4.15	3.43	0.89	7.58	8.00	8.47	9.00	8.75	7.50	
2794	0.35	0.41	0.76	0.40	7.30	2.73	1.04	10.03	6.00	11.07	8.00	3.05	2.00	
2608	1.56	1.86	3.42	3.00	3.19	3.26	4.19	6.45	6.00	10.64	7.00	5.18	5.00	

THE CHIEF PROVISIONS OF THE FERTILIZER LAW APPLYING TO MANUFACTURERS, IMPORTERS AND DEALERS.

The law for the regulation of the sale and analyses of commercial fertilizers makes the following requirements upon manufacturers, importers or dealers who propose to sell or offer for sale commercial fertilizers in the State:

1. *The Brand.* Each package shall bear, conspicuously printed, the following statements:

The number of net pounds contained in each package.

The name or trade mark under which it is sold.

The name of the manufacturer or shipper.

The place of manufacture.

The place of business of manufacturer or shipper.

The percentage of nitrogen or its equivalent in ammonia.

The percentage of potash soluble in water.

The percentage of phosphoric acid in available form.

The percentage of total phosphoric acid.

2. *The Certificate.* There shall be filed annually between Nov. 15 and Dec. 15 with the Director of the Station a certificate containing an accurate statement of the brand. This certificate applies to the next succeeding calendar year. (Blanks for this purpose will be furnished on application to the Station.)

3. *Manufacturer's Samples.* There shall be deposited annually, unless excused by the Director under certain conditions, a sample of fertilizer, with an accompanying affidavit that this sample "corresponds within reasonable limits to the fertilizer which it represents."

4. *Analysis fee.* For each brand of fertilizer sold or offered for sale in the state there shall be paid annually to the Director of the Station "an analysis fee as follows: Ten dollars for the phosphoric acid and five dollars each for the nitrogen and potash, contained or said to be contained in the fertilizer."

5. *The license.* Upon receipt of the fee, the certificate and the sample (if required), the Director of the Station "shall issue a certificate of compliance."

[The full text of the law will be sent to those asking for it.]

CHAS. D. WOODS, *Director.*

To fight insect and fungous pests is a necessary part of caring for many crops. The March Bulletin of the Maine Department of Agriculture will doubtless prove helpful to fruit growers because of its timely suggestions along these lines. It can be had on application to Hon. A. W. Gilman, Commissioner of Agriculture, Augusta, Maine.

The Station has the following special publications which it will send on application :

How to Fight Cucumber Enemies.

How to Fight Apple Enemies.

How to Fight Potato Enemies.

Some of the earlier reports and bulletins are still available for distribution. Much of the matter contained in them is as valuable to-day as when first printed. Lists of publications still in print will be sent on application to the Station.

